

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

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Application No.: Unassigned

Art Unit: Unassigned

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Examiner: Unassigned

For: NON-CIRCULAR, FLAT
MOTOR AND
MANUFACTURING
METHOD THEREOF

**SPECIFICATION, CLAIMS AND
ABSTRACT AS PRELIMINARILY AMENDED**

Amendments to the paragraph beginning at page 1, line 4:

The present invention relates to a flat motor used as a silent-~~alar~~arming alarm source in a mobile communications apparatus, and more particularly, to a non-circular, flat motor in which terminal portions are installed ~~at~~ in dead space.

Amendments to the paragraph beginning at page 1, line 12:

A conventional cylinder type vibration motor having a diameter of 4 mm is currently being widely used. However, since the vibration motor ~~should be~~ is mounted ~~by~~ using a holder, the actual diameter thereof becomes 5 mm, which ~~does~~ has not ~~keep~~ kept pace with the ongoing trend ~~to miniaturize~~ in miniaturizing portable ~~apparatuses~~ apparatus. Furthermore, the vibration motor ~~is of~~ a narrow cylinder ~~type~~ so that sufficient space in a radial direction for an eccentric weight installed at an output shaft cannot be secured, resulting in weak vibrations. In comparison, a flat motor having a thickness of 3 mm can be easily obtained. Also, a large space in a radial direction can be obtained. The conventional flat vibration motor is shown in FIG. 12.

mm can be easily obtained. Also, a large space in a radial direction can be obtained. The conventional flat vibration motor is shown in FIG. 12.

Amendments to the paragraph beginning at page 2, line 1:

With a recent trend in ~~a~~ small and light mobile communication apparatus, electric parts mounted thereon ~~becomes~~ must be small and light and there is a need for parts that can be reflow soldered, a type of soldering used in ~~the~~ automation of an assembly process. However, in the case of an apparatus using an electric part having a magnet, such as the flat motor, the magnet thermally deteriorates due to ~~a~~ the high temperature during ~~a~~ the process of reflow soldering. Also, it is difficult to hold the conventional motor, which is circular when viewed in a plane, with a transferring apparatus and the flexible sheet is very likely to be damaged when it is automatically mounted.

Amendments to the paragraph beginning at page 5, line 25:

FIG. 2 is a sectional view of a brushless type non-circular flat vibration motor according to a preferred embodiment of the present invention, taken along line ~~I-I~~ II-II of FIG. 1;

Amendments to the paragraph beginning at page 6, line 3:

FIG. 5B is a side view of the motor of FIG. 5A ~~viewing~~ viewed from the side indicated by arrow A;

Amendments to the paragraph beginning at page 6, line 7:

FIG. 6B is a side view of the motor of FIG. 6A ~~viewing~~ viewed from the side indicated by arrow B;

Amendments to the paragraph beginning at page 6, line 11:

FIG. 8 is a cross sectional view of the coreless type non-circular flat vibration motor of FIG. 7 taken along line ~~III-IV~~ VIII-VIII of FIG. 7;

Amendments to the paragraph beginning at page 7, line 12:

FIG. 2 shows a cross section of a square-shaped, axially ~~gaped~~ gapped, brushless type flat motor, taken along line ~~I-II~~ II-II of FIG. 1. That is, a shaft core 1a protrudes from the center of a metal stator ~~base~~ base 1 to which a printed circuit board is attached, and the shaft core 1a is coated with slippery resin to form a resin coated, fixed shaft 1S. A core holder 2 is integrally formed of the same resin ~~to be~~ slightly further out in the axial direction from the resin coated, fixed shaft 1S. A stator core 4 made by winding an armature coil 3 around a plurality of salient poles is welded to the core holder 2.

Amendments to existing claims:

1. (Amended) A non-circular flat motor comprising:
a rotor rotating about an axis aligned in an axial direction;
a housing ~~formed to be~~ which is non-circular ~~when viewed~~ in a plane perpendicular to the axial direction, which ~~rotatably~~ rotatably supports the rotor, and which has side surfaces, at least a part of side surfaces being a which are flat surface; and
a plurality of feeder terminals arranged ~~at an angled corner~~ at the side surface at corners of the housing ~~which is formed by~~ and electrically ~~insulating all terminals of high~~ insulated from other adjacent portions adjacent thereto of the motor.

2. (Amended) The motor as claimed in claim 1, wherein the housing includes a stator base and including an armature coil is arranged at a the stator base functioning as part of the housing, and a magnet facing the armature coil ~~is arranged at~~ and disposed on the rotor.

3. (Amended) The motor as claimed in claim 2, wherein the housing is substantially rectangular ~~when viewed in a~~ the plane and at least some of the feeder terminals ~~are formed~~ do not to protrude outward over the angled corner as an angled portion for installation beyond sides of the housing.

4. (Amended) The motor as claimed in claim 1, further comprising a flat magnet, a bracket as part of the housing ~~where~~ and on which the magnet is ~~arranged~~ disposed, a brush ~~incorporated with~~ connected to the feeder terminals ~~via~~ across a first gap between the bracket and the magnet, wherein the rotor receives electric power via the brush and faces the flat magnet ~~via~~ across a second gap in ~~an~~ the axial direction.

5. (Amended) The motor as claimed in claim 4, wherein a base end ~~portion~~ of the brush is ~~formed as~~ part of the feeder terminal ~~as it is.~~

6. (Amended) The motor as claimed in claim 4, wherein the housing is substantially rectangular ~~when viewed in a~~ the plane and at least some of the feeder terminals ~~are formed~~ do not to protrude outward over beyond the angled corner as an installation portion corners of the housing.

7. (Amended) A non-circular flat motor comprising:
a rotor rotating about an axis aligned in an axial direction;
a housing including a stator base having a shaft for supporting the rotor ~~provided at the center thereof and centrally located on the stator base, the housing having a non-circular shape when viewed in a plane perpendicular to the axial direction, at least some portion of the housing and being formed of~~ at least partially a resin; and
at least two feeder terminals arranged at ~~an angled~~ a corner at the of the housing on a side surface of the housing which is formed by, electrically insulating all the feeder terminals of high electric potential from other adjacent portions adjacent thereto of the motor.

8. (Amended) The motor as claimed in claim 7, wherein the shaft ~~is installed by erecting~~ has a fixed shaft core extending from one a portion of the housing constituting a stator ~~and coating~~, the shaft core ~~with resin to form~~ having a resin coated, fixed shaft coating, and the rotor is rotatably installed ~~from a tip of on~~ on the resin coated, fixed shaft, and ~~the~~ a tip of the shaft is inserted in a concave portion ~~installed at another portion~~ of the housing.

9. (Amended) The motor as claimed in claim 8, further comprising:
a magnetic yoke plate formed of a magnetic body and having, the shaft core integrally protruding from the center ~~thereof~~ of the magnetic yoke plate, constituting part of the housing;

a commutator;

a resin bracket including the resin coated, fixed shaft wherein the rotor includes the commutator;

a pair of brushes having ~~a free end~~ ends in sliding contact with the commutator and fixed such that at least two surfaces can expose base ends of the resin bracket portion through ~~the~~ a brush recess portion;

~~a resin bracket portion which includes a resin coated, fixed shaft made by incorporating in the resin bracket portion at least part of the yoke plate and coating the shaft core with resin; a rotor including a commutator; and~~

an armature coil having one end ~~portion~~ connected to the commutator and rotatably arranged at the resin coated, fixed shaft ~~to face~~, facing a magnet ~~via~~ across a gap, ~~a~~ wherein

the brush recess portion formed at the yoke plate to insulate insulates at least one brush; and

the magnet arranged at least is placed at the a yoke portion of the resin bracket ~~portion~~ after the brushes are ~~arranged~~ installed; and

a case accommodating the rotor and installed at the resin bracket ~~by inserting a~~, having a concave portion receiving the tip of the resin coated, fixed shaft ~~in a concave portion formed~~ at the center of the case, at least a magnetic path portion of the magnet being ~~formed of a magnetic body.~~

10. (Amended) The motor as claimed in claim 9, wherein the magnet is separated from the yoke plate by a ~~small~~ gap to enable reflow soldering.

13. (Amended) The motor as claimed in claim 9, wherein the resin of the resin coated, fixed shaft includes potassium titanate whisker and ~~has an anti-thermal feature~~ bearing withstands a thermal deformation temperature of over 200°C (18.5 kgf/cm²) and a ~~is slippery feature.~~

14. (Amended) A non-circular flat brushless motor comprising:
a metal plate incorporating a shaft support ~~portion at the a center thereof~~, forming a first part of a housing;
a fixed shaft supported by the shaft support ~~portion;~~
a rotor rotatably installed at a tip of the fixed shaft ~~from a tip thereof; and~~
a stator ~~formed of~~ including a plurality of armature coils arranged around the fixed shaft to drive the rotor; ~~and~~
~~wherein the other~~ a second part of the housing supports a supporting the tip of the fixed shaft.

16. (Amended) The motor as claimed in claim 14, ~~wherein including~~ a pinion ~~is~~ incorporated in the rotor.

17. (Amended) The motor as claimed in claim 1, wherein the rotor is ~~formed to be~~ eccentric to generate vibrations during rotation.

18. (Amended) The motor as claimed in claim 7, wherein the rotor is ~~formed to be~~ eccentric to generate vibrations during rotation.

19. (Amended) The motor as claimed in claim 9, wherein the rotor is ~~formed to be~~ eccentric to generate vibrations during rotation.

20. (Amended) A method of manufacturing a ~~brush-type~~ non-circular flat motor having brushes, the method comprising the steps of:

~~press-~~pressing a lead frame having a plurality of yoke plates ~~continuously installed~~
arranged at a predetermined pitch by a connection portion;

inserting the ~~continuously installed~~ yoke plates in an injection mold and ~~integrally~~
molding a resin bracket in the mold;

detaching at least ~~the~~ a connection portion of the yoke plates ~~among the~~ at
respective connection portions;

installing the rotor ~~at on~~ a fixed shaft ~~to be capable of~~ for rotating; and

installing ~~the~~ a case.

21. (Amended) The method as claimed in claim ~~32~~ 20, further comprising ~~steps~~
~~of:~~

fixing brushes to ~~a~~ the resin bracket by ~~a spot welding method,~~ the brushes ~~being~~
~~formed by continuously installing via a plurality of connection portions at~~ having the
same pitch as the ~~predetermined pitch~~ yoke plates; and

installing a magnet ~~at on~~ the yoke plate.

Amendments to the abstract

Abstract of the Disclosure

A non-circular flat motor in which terminal portions are installed at dead ~~space~~
spaces and a manufacturing method ~~thereof are disclosed.~~ ~~Since a flexible sheet type~~
~~feeder terminal is not adopted, the~~ The motor can be easily held by a transferring
apparatus and automatically mounted. ~~Also, the~~ The feeder terminal ~~has solderability and~~
~~is easy to be reflow soldered~~ easily reflow soldered. A rotor and a housing supporting the
rotor are ~~formed to be~~ non-circular when ~~viewed~~ in a plane perpendicular to the rotor
axis. Feeder terminals or installation terminals are arranged at ~~corner portions at the side~~
corners of surfaces of the housing ~~which are angled and using a circle as an inscribed~~
circle. At least one feeder terminal ~~of a high electric potential~~ is insulated from the other

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~~portion~~portions of the housing. The ~~corner portion is formed to~~ corners may be concave
so that each of the terminals ~~is prevented from protruding outward from~~ does not protrude
beyond the housing. Each of the terminals ~~are bent to be~~ is easily reflow-soldered and
exposed ~~to~~ at the side of the housing.

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